AMENDMENTS TO THE CLAIMS

Please cancel claims 1, 2, 4-19, 21, and 23-28, and add claims 29-37, as set forth in the listing of claims that follows.

The claims have been rewritten as claims 29-36. In particular, independent claim 1 is rewritten as claim 29, and independent claim 19 is rewritten as claim 34. In view of the cancellation of claims, Applicants' calculate that no fee is required for the addition of claims 29-36. In the event that a fee is deemed to be due, the Commissioner is authorized to charge the fee to Deposit Account No. 50-0831, in accordance with the final paragraph of this Amendment.

Claim 1-28 (Cancelled)

Claim 29. (New) A planar oxygen sensor comprising

a gas sensing arrangement comprising a pump cell, a reference cell, and a sensor chamber,

a heating device comprising a first heating device lead and a second heating device lead, said second heating device lead being adapted to be connected to a power terminal of a power source,

a ground plane electrode adapted for temperature measurement and comprising a first lead, a second lead, and a temperature sensing portion electrically interconnecting the first lead and the second lead, said temperature sensing portion

having an electrical resistance indicative of temperature, wherein at least said first lead is disposed between the gas sensing arrangement and the heating device and is electrically connected to said first heating device lead, said first lead having a surface area greater than the temperature sensing portion and an electrical resistance less than the electrical resistance of the temperature sensing portion,

a ground terminal connected to the first lead and the first heating device lead,

a resistance measurement terminal connected to the second lead, and

a power terminal connected to the second heating device lead,

whereby the ground terminal and the resistance measurement terminal are adapted to be connected to an electrical circuit for measuring the electrical resistance therebetween, said electrical resistance being indicative of temperature, and

whereby said power terminal and said ground terminal are adapted to be connected to a power source for providing electrical current to the heating device.

Claim 30. (New) A planar oxygen sensor according to claim 29 further comprising an isolation layer disposed between the ground plane electrode and the heating device.

Claim 31. (New) A planar oxygen sensor according to claim 29 further comprising a temperature measurement device comprising an electrical circuit connected to the ground terminal and the resistance measurement terminal.

Claim 32. (New) A planar oxygen sensor according to claim 31 wherein the temperature measurement device includes a first capacitor connected to the ground terminal and a second capacitor connected to the resistance measurement terminal.

Claim 33. (New) A planar oxygen sensor according to claim 31 wherein the temperature measurement device includes an AC signal source.

Claim 34. (New) In a planar oxygen sensor comprising a gas sensing arrangement that includes a pump cell, a reference cell, and a sensor chamber, and a heating device comprising a first heating device lead and a second heating device lead, a method for measuring a temperature of said planar oxygen sensor comprising:

providing a ground plane electrode adapted for temperature measurement and comprising a first lead, a second lead, and a temperature sensing portion electrically interconnecting the first lead and the second lead, said temperature sensing portion having an electrical resistance indicative of temperature, wherein at least said first lead is disposed between the gas sensing arrangement and the heating device and is electrically connected to said first heating device lead, said first lead having a surface area greater than the temperature sensing portion and an electrical resistance less than the electrical resistance of the temperature sensing portion, and

connecting a temperature measurement device to a said first lead and said second lead, said temperature measurement device being adapted to measure an electrical resistance of said ground plane electrode, whereby said resistance is indicative of the temperature of said planar oxygen sensor.

Claim 35. (New) A method according to claim 34 further comprising providing an isolation layer between the ground plane electrode and the heating device.

Claim 36. (New) A method according to claim 34 wherein the temperature measurement device comprises an electrical circuit connected to the ground terminal and the resistance measurement terminal, said electrical circuit comprising a first capacitor connected to the first lead and a second capacitor connected to the second lead.

Claim 37. (New) A method according to claim 34 wherein the temperature measurement device includes an AC signal source.